2025 MAST Conference: The Importance of Sensemaking in Science
Wednesday, November 5, 2025
Best Western Royal Plaza Hotel & Trade Center
181 Boston Post Road W, Marlborough, Massachusetts 01752

8:00 Registration and Exhibits Open - Light Breakfast available

8:30-9:30 Welcome & AI Keynote Panel: "Why you Need to be Thinking about AI in Science Education" - Ballroom/Salons A-E

9:30-10:00 Exhibit Time & Networking - Ballroom/Salons A-E

10:00-10:50 Session 1

- **#1 Enhancing Your Secondary Science Course with POGIL; Increasing Student Understanding and Concept Retention**
  Presenter: Julie Mills, Science Curriculum Leader - Apponequet High School
  Wayland Room High School Physics Presentation
  The Process Oriented Guided Inquiry Learning (POGIL) method is a student-centered inquiry-based process that serves as an alternative to more traditional lecturing. At the secondary level it can be a great tool to increase student engagement and understanding. Participants will have an opportunity to learn about the POGIL process and how to implement it in the classroom.

- **#2 Glow Up: How Bacteria Talk, Shine, and Turn Genes On**
  Presenter: Paul Damiani, Physical and Life Science Teacher - Milton High School
  Hudson Room High School Life Science Hands-on Workshop
  Ready for a classroom glow-up? Explore how bacteria communicate and light up using Vibrio campbellii in this hands-on lab investigating quorum sensing, gene control, and bioluminescence in action.

- **#3 Inquiry-based Lessons for People and the Planet**
  Presenters: Lesleigh Drake & Derrick Vernier - Nature's Classroom

Boxboro Room Middle School Earth & Space Sci Hands-on Workshop
Discover activities that use 3D learning and data literacy to make sense of human-environmental interactions. Explore carrying capacity in nature, global land use, resource extraction and human population trends. Engage in group activities – modeling, simulations and a resource management game – all meant to stimulate discussion and further exploration.

- **#4 Ocean Commotion: How is Climate Change Affecting Oceans?**
  Presenter: Peg LeGendre - Cape Cod Museum of Natural History
  Sudbury Room Elem/Middle Earth & Space Sci Hands-on Workshop
  Participants will explore how climate change affects sea levels and ocean acidity. Hands-on demonstrations will demonstrate two primary causes of sea level rise. Participants will conduct a simple experiment replicating the interaction between CO2 and ocean water. Finally, participants will explore the effects of increased ocean acidity on marine organisms.

- **#5 How To: Use Spreadsheets to Make Sense of Scientific Data for You and Your Students**
  Presenter: Sean Regan, Chemistry Teacher - Framingham School District
  Duchess Room Middle/High Tech/Engineering Hands-On Workshop
  (Bring your computer) In this session, you will gain skills in using spreadsheets to take sets of data and make them more manageable and distill results from them. Skills include graphing, filtering data, conditional formatting, and more.

- **#6 Data + CER > Average**
  Presenters: Annie Haven - Cape Cod Lighthouse Charter School
  Nancy Gifford - Monomoy Middle School
  Westboro Room Middle General Science Hands-On Workshop
  What do you get when you add CER to data exploration? Above average results for your budding scientists! Using the landmarks of data and information gathering, we will embark on a data and CER journey that will lay the foundation for using data to support CER activities in your classroom.

- **#7 Bats of Acadia National Park: Student-Led Ecology Simulation Game Design**
  Presenter: Renee Scherer - The Acera School
  Southboro Room All Grades Life Science Presentation
  Discover “Bats of Acadia National Park,” a classroom simulation game built by advanced elementary students to model bat populations, track data, and explore local impacts to ecological systems. This session highlights how AI tools supported the teacher’s scaffolding, while students drove research, design, and implementation.

- **#8 Backyard Science: Making Science Relevant and Accessible in the Elementary Grades**
  Presenter: Shawn O'Neill - Bridgewater State University Professor
  Sterling Room Elementary General Science Presentation
  Discover how connecting elementary science to local phenomena, like weather, plants, or schoolyard observations, can spark inquiry, support diverse learners, and align with Massachusetts standards. This presentation will offer hands-on examples and practical strategies to make science meaningful, accessible, and FUN for all students.

- **#9 Using Anchoring Phenomena and Driving Question Boards to Spark Student Questioning**
  Presenter: Ron Antinori - Activate Learning
  Princess Room Middle School General Science Hands-On Workshop
  The Driving Question Board, an essential tool used throughout OpenSciEd units to generate, keep track of, and revisit student questions around the anchoring and related phenomenon. It's a visual representation of the shared mission of learning in the unit. Come think like a student and gather resources like a teacher.

- **#10 Elevating student voices and perspectives to increase engagement and sensemaking**
  Presenters: Brianna Balke, Emily Laliberte, Kate McNeill
  Marlboro Room Middle/High General Science Presentation
  We will present teaching moves and curriculum adaptations that educators can make to elevate student voices and perspectives in support of a more equitable classroom. We will illustrate these using examples from real-world middle-school classrooms in Massachusetts that are a result of customizations that were made to the OpenSciEd curriculum.

11:00-11:50 Session 2

- **#11 Will having students build and program their own sensor devices improve learning in lab?**
  Presenter: Shawn Reeves - EnergyTeachers.org Inc.
  Wayland Room Middle/High General Science Hands-On Workshop
  Participants will connect sensors to micro-controllers with displays and enter code to help display and analyze the data. No prior experience required. We will discuss the value of students making their own lab equipment, arguably an important part of scientific endeavors. Participants can take one device if they make one.

- **#12 Making Sense of Equilibrium and Acids/Bases**
  Presenter: Heather Kurzman, Chemistry Teacher - Bedford High School
  Hudson Room High School Chemistry Presentation
  Do you struggle with conveying concepts of dynamic equilibrium, LeChatelier's Principle, and Acids & Bases to your 1st year high school chemistry class? If so, this workshop is for you! Two equilibrium demonstrations and a conceptual approach to classifying acids and bases will be shared with you.

- **#13 How do genetic differences affect behaviors like smoking?**
  Presenters: Kathy Vandiver & Amanda Mayer - MIT Edgerton Center
  Boxboro Room Middle/High Life Science Hands-On Workshop
  The basics of protein structure and function will be taught with the MIT hands-on models. Cytochrome P450 (CYP) proteins are important because they help eliminate drugs and toxicants from our bodies. Participants will construct CYP proteins and model the mechanisms behind smoking addiction and cancer risk.

- **#14 Identity Molecules**
  Presenters: Kathleen Boucher- Lavigne & Autumn Burton - Pike School
  Sudbury Room Elem/Middle Chemistry Hands-On-Workshop
  Culturally responsive teaching practices are essential in science. You will leave this workshop with NGSS based lessons to help students make sense of identity mapping and positionality in the classroom. Come and design models where identities are atoms and collective identities are molecules.

- **#15 From Curiosity to Claim: Data Talks in K–2 Classrooms as a Pathway to Sensemaking**
  Presenter: Jami Witherell - Nantucket Elementary School
  Duchess Room Elementary General Science Presentation
  How can young scientists make sense of data before they read charts? This session introduces “Data Talks” for K–2 classrooms—using visuals, models, and student-made data to drive sensemaking. Walk away with tools, talk routines, and real examples of how even non-readers can build scientific claims from classroom investigations.

- **#16 Customizing Science Lessons for Critical Consciousness and Science Identity**
  Presenters: Sarah Fogelman, Ji-Sun Ham & Maria Moreno Vera - Boston College Doctoral Candidates & Dr. Kate McNeill, Boston College Professor
  Westboro Room Middle School General Science Presentation

Discover how to customize science lessons to cultivate students' critical consciousness and science identity. Learn practical strategies like personal journaling, cultural reflection, and analyzing systemic inequities to foster deeper engagement, empathy, and belonging in your classroom.

- **#17 Bring Biofabrication to Your Classroom**
  Presenter: Kelly GravesonPayne - ARMI BioFabUSA
  Southboro Room All Grades Life Science Presentation
  By 2029, the Massachusetts life sciences industry is projected to grow by 16,000+ jobs. ARMI | BioFabUSA can help you prepare your K-12 students for related careers with free, industry-informed regenerative medicine and biofabrication activities and programs. From one-day Explore lessons to our 4-week BioTrek experience, there's something for you!

- **#18 AI Force Awakens: How High School STEM Teachers are Building Future-Ready Skills and Empowering Student Learning**
  Presenters: Jennifer Love & Claire Duggan - Northeastern University
  Mark Casto (Amesbury HS)
  Kathleen Bateman (Boston Latin School)
  Matt Costa, Nahuel Acosta Burroso, & Josh Miranda (Revere HS)
  Pakamas Tongcharoensirikul (Quincy HS)
  Lesley Dimond & Ross Clayton (Marshfield HS)
  Heather Giblin (Brookline HS)
  Ed Savage & Adam Sasso (Cohasset HS)
  Rebecca Zarch (SageFox Consulting)
  Sterling Room Middle/High General Science Presentation
  Join our interactive panel featuring Massachusetts high school STEM teachers from our NSF AI in Education professional learning community. Hear firsthand accounts of classroom AI implementation, including challenges, successes, and practical strategies to empower your own AI integration journey in STEM education.

- **#19 Arguing from Evidence with Data Routines**
  Presenters:
  Michael Santiago-Silvestri & Elizabeth Wermuth - Northbridge MS
  Emily Fagan & Amy Brodesky - Education Development Center
  Princess Room Middle School General Science Hands-On Workshop
  Engage students in science sensemaking through short, powerful data routines. Experience "Is It Valid?" and "Data Jigsaw,' designed to deepen understanding of key concepts in inquiry based science curricula. Try the routines, explore student work and

leave with ready-to-use resources and strategies for integrating real-world data into your science instruction.

- **#20 AI in the Science Classroom: Supporting Student Learning and Teacher Productivity**
  Presenters: Mia Dubosarsky - STEM Education Center at WPI
  Tiffany Davis - Ashburnham Westminster Regional Schools
  Marlboro Room All Grades General Science Hands-On Workshop
  Dive into the world of Artificial Intelligence (AI) to discover how it can change your teaching! Demystify AI by exploring practical tools for boosting productivity, differentiating instruction, and providing hands-on activities that spark curiosity in students. Learn also about important ethical considerations and privacy concerns associated with AI tools.

11:50-12:30 Lunch, Networking, & Exhibits - Ballroom/Salons A-E

12:30-1:15 DESE Updates & Raffle - Ballroom/Salons A-E

1:15-2:05 Session 3

- **#21 A Taste of Elementary OpenSciEd**
  Presenters: Donna Taylor - STEM Education Center at WPI
  Brian LaPointe - Ayer-Shirley Regional School District
  Wayland Room Elementary General Science Hands-On Workshop
  Curious to learn more about the new OSE Elementary curriculum? Join us to experience the shift in science pedagogy, supporting student driven instruction as they 'figure out' and explain a key phenomenon. Participants will experience an ‘Anchoring Phenomenon’, model their thinking, ask questions, and propose ways to investigate further.

- **#22 Schoolyard Sensemaking: Engaging with Phenomena in Nature**
  Presenters: Emma Scudder & Kathy Kennedy - Mass Audubon
  Ammie Ouellette - Fitchburg Public Schools
  Hudson Room Elem/Middle General Science Presentation
  The natural world is full of engaging phenomena! We’ll share key strategies, and back-pocket tools that will help you to bring your sensemaking routines into the schoolyard and engage students in place-based learning that invites them to discover, investigate, and make sense of the world around them.

- **#23 Braiding Citizen Science and Indigenous Knowledge in Science Education**
  Presenter: Bob Gilmore - Grade 5 Science Teacher, Milford Public Schools
  Boxboro Room Elem/Middle General Science Hands-On Workshop
  This session explores how citizen science projects can authentically integrate Indigenous knowledge and ways of knowing into the grade 5 science curriculum. Learn strategies for designing inclusive, place-based investigations that honor diverse worldviews, deepen ecological understanding, and empower students as community-connected scientists. Classroom examples and curricular links will be shared.

- **#24 Thinking Like Scientists: How Student-Led Research Fairs Build Sensemaking and Scientific Literacy**
  Presenters: Carol Stefany Rodriguez - Biology Teacher, Discovery Polytech Early College High School, Springfield, MA
  Rebekah Stendahl - Massachusetts Science and Engineering Fair
  Sudbury Room Middle/High General Science Hands-On Workshop
  Discover how student-led research projects spark curiosity, build scientific literacy, and support real sensemaking. This hands-on workshop guides you through turning student questions into investigations, using AI to support inquiry, and scaffolding science fair projects that are inclusive, accessible, and rooted in what students genuinely care about.

- **#25 Helping Students Talk About Authentic and Relevant Data**
  Presenters: Krista Fincke & Shari Feibel - Blue Hill Observatory
  Duchess Room Middle Earth & Space Sci Hands-On Workshop
  In this session, experience strategies to help middle school students use authentic and locally relevant data in conversations. Using 140 years of weather data and photographic evidence of changes in climate, you'll practice strategies from a student perspective and walk away with instructional tools you can implement tomorrow.

- **#26 Exploring carbon chemistry and climate change through hands-on labs and data investigations**
  Presenters: Jane Kang, Victor Mateas & Kristen Bjork - Education Development Center
  Westboro Room High School Chemistry Hands-On Workshop
  What ARE the data around carbon dioxide? How can concepts like combustion reactions and solubility help us understand carbon dioxide’s connection to climate change? How can we use carbon chemistry to design new methods to address climate change? You will leave with activities you can do with your students.

- **#27 Unveiling the Hidden Risks of Vaping: A Physiological and Genetic Investigation**
  Presenter: Paul Damiani - Milton High School
  Southboro Room Middle/High Life Science Hands-On Workshop
  This hands-on workshop investigates vaping's impact through physiological and genetic lenses. Participants will analyze case studies, simulate an ELISA to detect biomarkers, and use electrophoresis to explore genetic risks—connecting biotech tools with public health to examine disease susceptibility, environmental exposure, and personalized prevention strategies.

- **#28 Exploring Forms of Energy & Energy Transformations with K-12 Students**
  Presenter: Nancy Gifford - The NEED Project
  Sterling Room All Grades General Science Hands-On Workshop
  Explore through six hands-on stations just as your students would - motion, sound, thermal, radiant, electrical, and chemical energy. These lessons will make you feel confident to teach energy forms and transformations! Terminology designed for each grade level and the experiments highlight the science behind daily objects in our lives.

- **#29 Empowering Student Inquiry Through Sensemaking and Real-Time Feedback**
  Presenter: Jenna Mercury - Explore Learning
  Princess Room Middle School General Science Hands-On Workshop
  Transform your classroom into a hub of authentic scientific thinking. Experience hands-on sensemaking through ExploreLearning's Science Investigations, discover how real-time feedback accelerates student understanding, and leave with concrete strategies to foster deeper inquiry and engagement in your middle school science classroom. Please bring a digital device (laptop or tablet) to immerse yourself in the experience!

- **#30 Share-a-thon - Marlboro Room**
  This session has multiple presenters. Participants will flow throughout the room from one table to the next to hear about each of the topics described below.
  - **#30a 7 principles of sensemaking in Science teaching**
    Presenter: Pooja Tiwari - CATS Boston Academy
    Why sensemaking and why should I use them?
    According to Vale, "Science begins by asking questions and then seeking answers. Young children understand this intuitively as they explore and try to make sense of their surroundings. . . . Encouraging questioning helps to bring the true spirit of science into our educational system, and the art of asking good questions constitutes an important skill to foster for practicing scientists."

Asking questions helps students make connections between activities and anchoring phenomena / focus question helps organize learning into a “road map” for students

- **#30b Modeling Characteristics of Wetlands: Project Ideas for the Elementary Level**
  Presenter: Anna Grant - Fayerweather Street School, Cambridge
  This lesson series on modeling the characteristics of wetlands has a strong focus on place-based science education and highlights the importance of engaging students as primary researchers. Hands-on activities and original data collection are crucial for elementary level science, and learning the mechanics, history, and ecosystem services of wetlands is paramount to a place-based education in Massachusetts.

- **#30c Results of the First Astronomical Science Writing Contest for High-school Students**
  Presenter: William Waller - National Astronomy Education Coordinator for the International Astronomical Union's Office of Astronomy for Education
  This pilot contest successfully engaged high-school students in astronomical writing, albeit on a small scale. To expand the program further, it will be necessary to develop more robust mechanisms for widespread promotions, greater numbers of qualified reviewers, more prizes, and the funding to support these efforts. All input in these regards is most welcome.

- **#30d Marine Species Changes in Distribution**
  Presenter: Carolina Bastidas - MIT Sea Grant
  This workshop introduces the use of tools and analysis of data on marine species distributions. Participants explore spatial and temporal patterns using timelines, site-specific occurrences, and customizable data layers. The activity encourages discussions about warming waters effects and the role of data-driven tools in supporting scientists, policymakers, and communities.

- **#30e Student Engagement in the High School science classroom**
  Presenter: Dr. James Anderson - Boston Public Schools
  Science is social and needs to be socially engaging! Students can’t cognitively engage in the science and engineering practices to build the science ideas needed to explain how or why a phenomenon occurs without opportunities to share ideas, build on each other’s ideas, provide each other feedback, and change their minds. (Anderson, J., 2025; NSTA, 2025)

- **#30f Hands-On Strategies to Spark Curiosity and Computational Thinking**
  Presenters: Bonnie Nieves - Southbridge Middle School
  Diane Horvath - Medfield Public Schools
  Audra Kaplan - Arlington Public Schools
  Do you find it hard to incorporate math and computational thinking into your lessons? imagi makes coding approachable and contagious! Students create, test, and revise Python-coded pixel art, reinforcing computational thinking through hands-on sensemaking. The imagiCharm sparks curiosity and helps students visualize patterns, explore solutions, and build confidence. Free resources provided!

2:05-2:30 Exhibit Time & Networking - Ballroom/Salons A-E

2:30-3:20 Session 4

- **#31 Using En-ROADS: A tool to help teach about climate change**
  Presenters: Denise Linder & Jane Heinze-Fry - Grafton High School
  Wayland Room Middle/High General Science Hands-On Workshop
  En-ROADS is an interactive climate solutions simulator. Participants select climate solutions to meet global temperature goals; then receive feedback data on solution efficacy for impacts such as: food production, sea level rise, ecosystem biodiversity, public health, and extreme weather. En-ROADS catalyzes evidence-based communication about climate change: causes, impacts, and solutions.

- **#32 Using case studies allows "sensemaking"**
  Presenter: Susannah Gal - Wentworth Institute of Technology Professor of Biology
  Hudson Room Middle/High General Science Hands-On Workshop
  Using case studies in teaching science classes is a useful strategy for giving students an opportunity to apply their learning to real situations. The Case Studies in Science website is a great resource for materials to make this approach easy to apply for all types of science courses.

- **#33 Bringing the Galápagos to the Classroom: Using Field Research to Enrich Science Instruction - An Elaine Adams Award Presentation**
  Presenter: Bob Gilmore - Grade 5 Science Teacher, Milford Public Schools

Boxboro Room Elem/Middle General Science Presentation
This presentation explores how participation in Ecology Project International's Galápagos program enhanced my ability to teach about ecosystems, adaptation, and conservation. Learn how field-based science experiences translate into meaningful, standards-aligned classroom instruction that fosters inquiry, critical thinking, and environmental literacy in students. Inspire inquiry through real-world connections.

- **#34 Careers in Action: Role-Playing Scientific Breakthroughs**
  Presenter: Maggie Keeler - MassBioEd Foundation
  Sudbury Room Middle/High Life Science Hands-On Workshop
  Explore our free online role-playing curriculum, where students become science experts, tackling real-world challenges. Gain tools to guide collaborative discussions on drug development, plastic pollution, and the gut microbiome (beta). Leave ready to inspire critical thinking and data-driven problem-solving in your classroom.

- **#35 Making Sense Relevant: How to connect science concepts to students' lived experience**
  Presenter: Dr. Jesse Wilcox - Assistant Professor of Biology and Science Education, University of Northern Iowa, Cedar Falls, IA
  Duchess Room All Grades General Science Hands-On Workshop
  Come engage in an earth science activity about geologic time periods (MS-ESS1-4) and a biology activity about cell membranes (MS-LS1-2) to explore how to make science relevant for their students. We will also demonstrate and discuss strategies for increasing the relevance of any NGSS lesson.

- **#36 Sensemaking Scaffolds – Facilitation tools leveraging disciplinary literacies to support students' scientific sensemaking**
  Presenters: Tej Dalvi, Pat Paugh, Jihan Mehideen, Jack McLarnon & Christa Iwanoski - UMass Boston
  Westboro Room Elem/Middle General Science Presentation
  Sensemaking is an active figuring-out process that engages students in reasoning while using various language-based modalities. Our teacher-research team presents sensemaking scaffolds as facilitation tools that respond to student ideas and support reasoning. Each scaffold combines a resource/tool with aligned teacher facilitation to engage students meaningfully with the tool.

- **#37 Landing Pads Logic – Bounce Height Measurements with MATLAB**
  Presenters: Carrie Baldwin - Youth Engineering Solutions (YES), Museum of Science, Boston

Sterling Room Middle School Tech/Engineering Hands-On Workshop
Integrate computer science into engineering using MATLAB Live Scripts from MathWorks. Guide students in using automation to measure ping pong ball bounce heights on different materials. Explore image masking, video frame analysis, and algorithm development in a browser-based environment—allowing data collection and coding without prior programming experience.

- **#38 Talk, Draw, Think: Whiteboarding Your Way To Scientific Sense-Making**
  Presenters: Kathie Hoey - Westborough High School
  Patricia Gahagan - Leicester High School
  Princess Room All Grades General Science Hands-On Workshop
  Peer into student thinking through the power of whiteboards! This interactive session equips K-12 science teachers with strategies on how to implement modeling, discourse, collaboration, and formative assessment to spark curiosity, fuel discussion, and bring three- dimensional learning to life - one marker stroke at a time!

- **#39 Using Classroom Science Performance Assessments to create equitable opportunities for students**
  Presenters: Corrine Steever & Sonia Neuburger - DESE
  Marlboro Room Elem/Middle General Science Hands-On Workshop
  The Massachusetts Department of Elementary and Secondary Education (DESE) has been developing grades 3-8 science performance assessments to provide open-source examples of high-quality science assessments for educators to use in the classroom. These are designed to meet the expectations of the MA STE Standards and be coherent with high-quality instructional materials. During the presentation, DESE staff will provide an overview of the performance assessment system design, opportunities to explore the open-source classroom science performance assessments, and resources for implementing the assessments and analyzing student work.

3:30-4:00 MAST Annual Meeting - Ballroom/Salons A-E